Please amend the claims as follows:

Claim 1 (Original): An optical regeneration system for regenerating a degenerated optical signal, including a regenerator which comprises at least one of devices consisting of a soliton converter, a pulse roller, a Kerr shatter and a soliton purifier.

Claim 2 (Original): The optical regeneration system according to claim 1, wherein a polarizing converter is included either in a previous stage before said regenerator or inside said regenerator.

Claim 3 (Currently Amended): The optical regeneration system according to claim 1 ~~or 2~~, wherein a demultiplexer is included in a previous stage before said regenerator, or before said polarizing converter when said polarizing converter is placed before said regenerator.

Claim 4 (Currently Amended): The optical regeneration system according to ~~any one of claims 1 to 3~~ claim 1, wherein a multiplexer is included in a stage after said regenerator.

Claim 5 (Currently Amended): The optical regeneration system according to ~~any one of claims 1 to 4~~ claim 1, wherein a phase compensator is included in a stage before said generator, before said polarizing converter when said polarizing converter is placed before said regenerator, or before said demultiplexer when said demultiplexer is placed before said polarizing converter.

Claim 6 (Original): The optical regeneration system according to claim 1, wherein a multiplexer mixing an optical signal generated by said regenerator with another optical signal is included at an output side of said regenerator.

Claim 7 (Original): The optical regeneration system according to claim 1, wherein said regenerators are serially connected in multi stages.

Claim 8 (Original): The optical regeneration system according to claim 7, wherein an optical switch is included between said regenerators serially connected in multi stages.

Claim 9 (Currently Amended): The optical regeneration system according to ~~any one of claims 1 to 8~~ claim 1, wherein an input power is adjusted before said regenerator.

Claim 10 (Original): A waveform reshaping device having a soliton converter comprising an anomalous dispersion fiber (ADF) in which a fiber length thereof is up to twice of that of a soliton frequency.

Claim 11 (Original): The waveform reshaping device according to claim 10, wherein an optical filter is included in a stage after said anomalous dispersion fiber.

Claim 12 (Currently Amended): The waveform reshaping device according to claim 10~~ or 11~~, wherein an optical amplifier is included in a stage before said anomalous dispersion fiber.

Claim 13 (Currently Amended): The waveform reshaping device according to claim 10, wherein a Mamyshev filter or a NOLM is included in place of the soliton converter.

Claim 14 (Currently Amended): The waveform reshaping device according to ~~any one of claims 10 to 13~~ claim 10, wherein a pulse compressor is included at an input side.

Claim 15 (Original): The waveform reshaping device according to claim 14, wherein said pulse compressor utilizes an adiabatic compression.

Claim 16 (Original): The waveform reshaping device according to claim 14, wherein said pulse compressor includes a dispersion decreasing fiber in which the dispersion is decreasing in a longitudinal direction of the optical fiber.

Claim 17 (Original): The waveform reshaping device according to claim 14, wherein said pulse compressor includes an SDPF in which the dispersion has a step like profile in a longitudinal direction of the optical fiber.

Claim 18 (Original): The waveform reshaping device according to claim 14, wherein said pulse compressor includes a CDPF in which the dispersion has a comb like profile in a longitudinal direction of the optical fiber.

Claim 19 (Original): The waveform reshaping device according to claim 14, wherein said pulse compressor includes an optical fiber in which nonlinearity is increasing in a longitudinal direction of the optical fiber.

Claim 20 (Original): The waveform reshaping device according to claim 14, wherein said pulse compressor includes an optical fiber in which nonlinearity has a step like profile increasing in a longitudinal direction of the optical fiber.

Claim 21 (Original): The waveform reshaping device according to claim 14, wherein said pulse compressor includes an optical fiber in which nonlinearity has a comb like profile increasing in a longitudinal direction of the optical fiber.

Claim 22 (Original): The waveform reshaping device according to claim 14, wherein said pulse compressor includes a Raman amplifier.

Claim 23 (Original): The waveform reshaping device, wherein a saturable absorption substance having a saturable absorption characteristic is used in place of the soliton converter.

Claim 24 (Original): The waveform reshaping device according to claim 23, which further comprises a position adjustment unit in which the saturable absorption characteristic is made variable by adjusting a position of said saturable absorption substance.

Claim 25 (Currently Amended): The waveform reshaping device according to claim 23~~ or 24~~, wherein said saturable absorption characteristic has a surface distribution.

Claim 26 (Original): A Kerr-shutter comprising a demultiplexer, an OPLL (Optical Phase Locked Loop), and an optical switch.

Claim 27 (Original): The Kerr-shutter according to claim 26, wherein L_{Loop} is determined by satisfying the following equation:

$\Delta\omega(L_{Loop}) < v \cdot X / n \cdot L_{A\text{-}B}$

where

$\Delta\omega$: bit rate difference in the OPLL,

L_{Loop}: loop length,

v: velocity of the light in the optical fiber,

$L_{A\text{-}B}$: length of fiber between the demultiplexer and the optical switch,

n: refraction index of the fiber, and

X: arbitrary number.

Claim 28 (Currently Amended): The Kerr-shutter according to claim 26~~ or 27~~, wherein said OPLL comprises an optical LO generator generating an optical LO, a phase comparator detecting phase difference between an external optical signal and said optical LO signal, and a controller to control a frequency of said LO signal based on the phase difference.

Claim 29 (Original): The Kerr-shutter according to claim 28, wherein said phase comparator includes an FWM unit generating an FWM light, an optical filter and a photo receiving device.

Claim 30 (Original): The Kerr-shutter according to claim 28, wherein said FWM unit adopts either a high nonlinear optical fiber, a PPLN (Periodically-poled $LiNO_3$), or an SOA (Semi-conductive Optical Amplifier).

Claim 31 (Currently Amended): The Kerr-shutter according to claim 29~~ or 30~~, wherein said photo receiving device has a pulse roller which is placed in a front stage and monitors frequency characteristic of pulses entering to the photo receiving device.

Claim 32 (Original): The Kerr-shutter according to claim 28, wherein said LO generator has a beat light generator.

Claim 33 (Original): The Kerr-shutter according to claim 32, wherein said beat light generator comprises at least one semiconductor laser which emits a CW light with at least two frequency components and an optical coupler which mixes said CW lights.

Claim 34 (Original): The Kerr-shutter according to claim 33, wherein said semiconductor lasers are driven in series.

Claim 35 (Currently Amended): The Kerr-shutter according to ~~any one of claims 26 to 34~~ claim 26, wherein an optical fiber compressor is inserted between said beat light generator and said optical switch.

Claim 36 (Currently Amended): The Kerr-shutter according to ~~any one of claims 28 to 30~~ claim 28, wherein said phase comparator includes a PD (Photo Diode), a Loop Filter and an LD controller, and wherein said PD generates a photo current by a two photon absorption effect.

Claim 37 (Original): The Kerr-shutter according to claim 36, wherein said PD is made of a silicon avalanche photodiode (SiAPD).

Claim 38 (Original): The Kerr-shutter according to claim 21, wherein said optical switch includes an FWM unit, an optical filter and a phase controller.

Claim 39 (Original): The Kerr-shutter according to claim 38, wherein said phase controller is controlled so that the phase control output does not to drift for change of an ambient temperature.

Claim 40 (Original): The Kerr-shutter according to claim 39, wherein said phase control output is controlled by a feedback of an output pulse.

Claim 41 (Original): The Kerr-shutter according to claim 38, wherein said FWM unit has a relation expressed by the following equation:

$$\Delta\nu > \frac{|\Delta\nu_p + \Delta\nu_s|}{2}$$

where;

$\Delta\nu$: frequency delta (detuning amount) between a pump light and an optical signal,

$\Delta\nu_p$: spectrum width of an input pumping pulse, and

$\Delta\nu_s$: spectrum width of an input signal pulse.

Claim 42 (Original): The Kerr-shutter according to claim 38, wherein said FWM unit has a relation expressed by the following equation:

$\Delta L > \Delta\nu_p + (\Delta\nu_s/2)$

where;

ΔL: fiber length,

$\Delta\nu_p$: spectrum width of an input pumping pulse, and

$\Delta\nu_s$: spectrum width of an input signal pulse.

Claim 43 (Original): The Kerr-shutter according to claim 38, wherein said fiber length L is determined by the following equation:

$$1 < \frac{L}{L_{NL}} = \gamma P_0 L$$

$$\gamma P_P L \leq \frac{3\pi}{2}$$

Claim 44 (Original): The Kerr-shutter according to claim 38, wherein the fiber length L of said FMW unit is determined by the following equation:

$$\frac{L}{L_{SOD}} < \frac{1}{2}, \frac{L}{L_{TOD}} < \frac{1}{2}$$

$$\beta_3 < \frac{1.7628^3}{2} \frac{\Delta t_p^3}{L}$$

$$\beta_3 < \frac{1.7628^2}{4\pi} \frac{\Delta t_s^2}{L \Delta \nu}$$

Claim 45 (Original): The Kerr-shutter according to claim 38, which is designed by the following steps of:

a process to determine a detuning amount $\Delta\nu$ which is a value to avoid a spectrum overlapping using the equation regarding the pumping pulse (Δt_p, $\Delta\nu_p$) and the signal pulse (Δt_s, $\Delta\nu_s$);

$$\Delta\nu > \frac{|\Delta\nu_p + \Delta\nu_s|}{2}$$

a process to determine the fiber length L to obtain the FWM bandwidth exceeding $2\Delta\nu$;

a process to determine the pumping peak power P_p which can generate an FWM without distortion in the spectrum waveform using the equation;

$$1 < \frac{L}{L_{NL}} = \gamma P_0 L$$

$$\gamma P_P L \leq \frac{3\pi}{2}$$

and

a process to determine the third order dispersion value β_3 which is necessary to suppress a time waveform distortion of the pulse during the fiber transmission using the following equation:

$$\beta_3 < \frac{1.7628^3}{2} \frac{\Delta t_p{}^3}{L}$$

$$\beta_3 < \frac{1.7628^2}{4\pi} \frac{\Delta t_s{}^2}{L\Delta\nu}$$

Claim 46 (Currently Amended): The Kerr-shutter which further comprises an optical LO generator, and a controller, wherein the FWM unit is commonly shared with said optical phase comparator in claim 29 and ~~said~~ <u>an</u> optical switch ~~in claim 38~~ <u>including an FWM unit, an optical filter and a phase controller</u>.

Claim 47 (Original): A pulse roller having a pulse roller fiber with high nonlinear characteristic.

Claim 48 (Original): The pulse roller according to claim 47, wherein said pulse roller fiber comprises a normal dispersion increasing fiber having a characteristic in which normal dispersion is increasing in a longitudinal direction.

Claim 49 (Original): The pulse roller according to claim 47, wherein said pulse roller fiber has a characteristic in which nonlinearity is decreasing in a longitudinal direction.

Claim 50 (Currently Amended): The pulse roller according to ~~any one of claims 47 to 50~~ claim 47, wherein said pulse roller fiber comprises a distribution management optical fiber which is a combination of at least two fibers which have different normal dispersion and different nonlinearity characteristic in a longitudinal direction.

Claim 51 (Original): The pulse roller according to claim 50, wherein an optical fiber whose dispersion is dominant in a longitudinal direction and an optical fiber whose nonlinearity is dominant in a longitudinal direction are arranged in said distribution management optical fiber.

Claim 52 (Original): The pulse roller according to claim 51, wherein said dispersion characteristic of the optical fiber in which the dispersion is dominant and said nonlinearity characteristic of the optical fiber in which the nonlinearity is dominant are arranged to form a step-like profile in the dispersion management optical fiber.

Claim 53 (Original): The pulse roller according to claim 51, wherein said dispersion characteristic of the optical fiber in which the dispersion is dominant and said nonlinearity characteristic of the optical fiber in which the nonlinearity is dominant are arranged to form a comb-like profile in the dispersion management optical fiber.

Claim 54 (Currently Amended): An OTDM signal generator comprising the pulse roller according to ~~any one of claims 48 to 51~~ claim 48 and the optical switch according ~~to claim 38~~ including an FWM unit, an optical filter and a phase comparator.

Claim 55 (Original): A soliton purifier wherein a soliton fiber is placed between two optical filters.

Claim 56 (Original): The soliton purifier according to claim 55, wherein the gain slope (slope of gain) is controlled by a stimulated Raman scattering so that soliton wave shift is realized in said soliton fiber.

Claim 57 (Currently Amended): The soliton purifier according to claim 55~~-or 56~~, wherein said soliton fiber comprises a highly nonlinear fiber.

Claim 58 (Currently Amended): The soliton purifier according to ~~any one of claims 55 to 57~~ claim 55, which further comprises a pumping light generator for generating external pumping light, wherein a stimulated Raman scattering is generated by said external pumping light.

Claim 59 (Currently Amended): The soliton purifier according to ~~any one of claims 55 to 58~~ claim 55, which further includes a pulse compressor at an input side.

Claim 60 (Currently Amended): The soliton purifier according to claim 58, wherein a stimulated Raman scattering is generated while performing a soliton adiabatic compression.

Claim 61 (Original): A soliton noise controlling method of determining a maximum transmission distance at predetermined noise amplification gain based on a duty ratio (ratio of pulse period vs pulse width) and a dispersion distance during an optical nonlinear signal processing using an optical soliton train.

Claim 62 (Original): The soliton noise controlling method according to claim 61, wherein a CS-RZ pulse train is used as a modulation method.

Claim 63 (Currently Amended): A optical transmission system wherein the optical regeneration systems according to ~~any one of claims 1 to 9~~ claim 1 are serially connected in multi stages.